corresponding to the particular devices on each card. Referring to Fig. 8, slave MCDs 39a-39n search PMD file 48 in memory 40 on central processor 12 for a match with their line card type and version number. Just as the master MCD 36 found the name of the MKI executable file for each line card in the PMD file, each slave MCD 39a-39n reads the PMD file to learn the names of all the device driver executable files associated with each line card type and version. The slave MCDs provide these names to the slave SRMs on their boards. Slave SRMs 37a-37n then download and execute the device driver executable files (DD.exe) 56a-56n from memory 40. As one example, one port device driver 43a-43d may be started for each port 44a-44d on line card 16a. The port driver and port are linked together through the assigned port PID number.

In order to understand the significance of the PMD file (i.e., metadata), note that the MCD software does not have knowledge of board types built into it. Instead, the MCD parameterizes its operations on a particular board by looking up the card type and version number in the PMD file and acting accordingly. Consequently, the MCD software does not need to be modified, rebuilt, tested and distributed with new hardware. The changes required in the software system infrastructure to support new hardware are simpler modify logical model 280 (Fig. 3) to include: a new entry in the PMD file (or a new PMD file) and, where necessary, new device drivers and applications. Because the MCD software, which resides in the kernel, will not need to be modified, the new applications and device drivers and the new DDL files (reflecting the new PMD file) for the configuration database and NMS database are downloaded and upgraded (as described below) without re-booting the computer system.

Network Management System (NMS):

Referring to Fig. 9, a user of computer system 10 works with network management system (NMS) software 60 to configure computer system 10. In the embodiment described below, NMS 60 runs on a personal computer or workstation 62 and communicates with central processor 12 over Ethernet network 32 (out-of-band). Instead, the NMS may communicate with central processor 12 over data path 34 (Fig. 1, in-band). Alternatively (or in addition as a back-up communication port), a user may

communicate with computer system 10 through a terminal connected to a serial line 66 connecting to the data or control path using a command line interface (CLI) protocol. Instead, NMS 60 could run directly on computer system 10 provided computer system 10 has an input mechanism for the user.

NMS 60 establishes an NMS database 61 on work station 62 using a DDL file corresponding to the NMS database and downloaded from persistent storage 21 in computer system 10. The NMS database mirrors the configuration database through an active query feature (described below). In one embodiment, the NMS database is an Oracle database from Oracle Corporation in Boston, Massachusetts. The NMS and central processor 12 pass control and data over Ethernet 32 41 using, for example, the Java Database Connectivity (JDBC) protocol. Use of the JDBC protocol allows the NMS to communicate with the configuration database in the same manner that it communicates with its own internal storage mechanisms, including the NMS database. Changes made to the configuration database are passed to the NMS database to insure that both databases store the same data. This synchronization process is much more efficient and timely than older methods that require the NMS to periodically poll the network device to determine whether configuration changes have been made. In these systems, NMS polling is unnecessary and wasteful if the configuration has not been changed. Additionally, if a configuration change is made through some other means, for example, a command line interface, and not through the NMS, the NMS will not be updated until the next poll, and if the network device crashes prior to the NMS poll, then the configuration change will be lost. In computer system 10, however, command line interface changes made to configuration database 42 are passed immediately to the NMS database through the active query feature ensuring that the NMS is immediately aware of any configuration changes.

Typically, work station 62 is coupled to many network computer systems, and NMS 60 is used to configure and manage each of these systems. In addition to configuring each system, the NMS also interprets data gathered by each system relevant to each system's network accounting data, statistics, and fault logging and presents this to the user.